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Attorney Docket: RO0230US (#90568)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Reinhard Koch, Frank Müller and Jorgen Friies

Serial No. : 09/308,407 Group No. : 1772

Filed: : July 8, 1999 Examiner : M.Miggins

For : SEALING MEDIUM FOR COMPOSITE PACKAGING MATERIALS

Box AF
Commissioner for Patents
Washington, D.C. 20231

TRANSMITTAL OF APPEAL BRIEF

Dear Sir:

1. Transmitted herewith, in triplicate, is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on March 14, 2001.

NOTE: "The appellant shall, within 2 months from the date of the notice of appeal under § 1.191(a) or within the time allowed for response to the action appealed from, if such time is later, file a brief in triplicate."

2. STATUS OF APPLICANT

This application is on behalf of

(X) other than a small entity.

() a small entity.

A verified statement:

() is attached.

() was already filed.

CERTIFICATE OF MAILING

I hereby certify that this document is being deposited with the United States Postal Service as First Class mail in an envelope addressed: Box AF, Commissioner for Patents, Washington D.C. 20231, on the date below.

May 14, 2001
Date


Katherine R. Vleyra

3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 CFR 1.17(c), the fee for filing the Appeal Brief is:

(<input type="checkbox"/>)	small entity	\$ 155.00
(X)	other than a small entity	\$ 310.00

APPEAL BRIEF Fee Due: **\$310.00**

4. EXTENSION OF TERM

NOTE: The time periods set forth in 37 CFR 1.192(a) are subject to the provisions of §1.136 for patent applications. 37 CFR 1.191(d). See also Notice of November 5, 1985 (1060 O.G. 27).

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136 apply.
(complete (a) or (b) as applicable)

<u>Total months requested</u>	<u>Fee for other than small entity</u>	<u>Fee for small entity</u>
(<input type="checkbox"/>) one month	\$ 110.00	\$ 55.00
(<input type="checkbox"/>) two months	\$ 390.00	\$195.00
(<input type="checkbox"/>) three months	\$ 890.00	\$445.00
(<input type="checkbox"/>) four months	\$1,390.00	\$695.00

Fee \$ _____

If an additional extension of time is required, please consider this a petition therefor.

(Check and complete the next item, if applicable)

() An extension for _____ months has already been secured and the fee paid therefor of \$ _____ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request \$.

Or

(X) Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

5. TOTAL FEE DUE

The total fee due is:

Appeal Brief fee	\$310.00
Extension fee (if any)	\$

TOTAL Fee Due: **\$310.00**

6. FEE PAYMENT

() Check in the amount of \$
() Credit Card Payment Form authorizing a charge in the amount of \$310.00.
() Charge Account No. 08-2441 in the amount of \$
A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 CFR 1.22(b).

7. FEE DEFICIENCY

WARNING: If no fees are to be paid on filing the following items should not be completed.

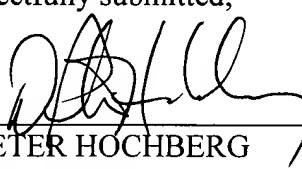
NOTE: IF there is a deficiency and there is no authorization to charge an account, additional fees are necessary to cover the additional time consumed in making up the original deficiency. If the maximum six-month period has expired before the deficiency is noted and corrected, the application is held abandoned. In those instances where authorization to charge is included, processing delays are encountered in returning the papers to the PTO Finance Branch in order to apply these charges prior to action on the cases. Authorization to charge the deposit account for any fee deficiency should be checked. See the Notice of April 7, 1986, 1065 O.G. 31-33.

The Commissioner is hereby authorized to charge the following additional fees required by this paper and during the entire pendency of this application to Deposit Account No. 08-2441.

(X) 37 CFR 1.16 (filing fees)
(X) 37 CFR 1.16 (presentation of extra claims)
(X) 37 CFR 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)
(X) 37 CFR 1.17 (application processing fees)
() 37 CFR 1.18 (issue fee at or before mailing Notice of Allowance, pursuant to 37 CFR 1.311(b)).

Respectfully submitted,

Date: May 14, 2001


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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Reinhard Koch, Frank Müller and Jorgen Friies
Serial No. : 09/308,407
Filed : July 8, 1999
Title : SEALING MEDIUM FOR COMPOSITE PACKAGING MATERIALS
Group : 1772
Examiner : M. Miggins
Attorney Dkt No. : RO0230US (#90568)

Box AF
Commissioner for Patents
Washington, D.C. 20231

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APPEAL BRIEF

Dear Sir:

This brief is in furtherance of the Notice of Appeal filed in this case on March 14, 2001. The fees required under §1.17(c) are dealt with in the accompanying "Transmittal of Appeal Brief."

This brief is submitted in triplicate (37 C.F.R. 1.192(a)).

Real Party in Interest The real party in interest is the assignee of the applicant, LTS Lohmann Therapie-Systeme AG. This application was assigned from Reinhard Koch, Frank Müller and Jorgen Friies to LTS Lohmann Therapie-Systeme AG on May 28, 1999 and recorded in the United States Patent and Trademark Office on July 8, 1999 at Reel 010131 and Frame 0870 on four (4) pages. A copy of the assignment document is attached.

Related Appeals and Interferences There are no appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims Claims 9-17 are pending in the application. The rejection of claims 9-17

is being appealed.

Status of Amendments An amendment has been filed concurrent with this appeal brief on May 14, 2001 to respond to Examiner's objection to claim 17 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Accordingly, applicant amended claim 17 to delete "encompassed".

Summary of Invention The invention is based on the object of providing a sealing medium which develops sufficiently high adhesive strengths when applied in an extremely thin layer, has the consistency of a printing ink which can be processed with conventional printing machines, allows insignificant uptake of active ingredient because of its chemical composition, in particular displays a barrier function towards volatile active ingredients such as nicotine, and can be used without difficulty, for example without elaborate drying of a laminating adhesive or melting of a comparatively thick sealing film, in simple processes (page 2, lines 1-14). The object is achieved by the creation of a packaging system made of composite packaging material for the sealed enclosure of products, such as transdermal therapeutic systems, which are subject to changes due to exchange with their environment or to partial volitilization of active ingredient. This packaging system contains, on the product side, a barrier layer to which a heat sealing layer is applied by providing a heat sealing lacquer which is in the form of a liquid phase for applying extremely thin sealing layers in a printing process, for example to partial areas of composite packaging materials (page 2, lines 18-21). The achievement of the invention is that, as a consequence of its small layer thickness, the sealing lacquer permits insignificant uptake of active ingredient (page 2, lines 23-25). Moreover, the possibility of applying the sealing laquer of the invention in a printing process only to specific areas of packaging materials (page 2, lines 26-28) means a further reduction in the amount used. Thus the costs of materials as well as possible interactions with active ingredient in the packaged plaster are likewise reduced. The small amount of sealing medium used has advantages both in ecological and in economic respects not only for the production of plaster packaging but also for the disposal thereof. In addition, using a printing process facilitates accurate application of the sealing lacquer to only the sealing area and thus reduces interactions between product and packaging material. On the other hand, use of the sealing laquer only in the sealing area means that it is possible to have packaging systems in which desired interactions, for example, between product and packaging as in the case of moisture absorbers (page 3, line 6), can take the desired form. By

contrast, with the full-area sealing layers previously employed, the films or sheets always formed a first layer completely surrounding the product of a packaging. The invention makes it possible for sealing layers which can be applied thereby to packaging material areas to have weights per unit area between 1 and 15 g/m², preferably weights per unit area between 2.5 and 3.5 g/m² (page 3, lines 22-25).

Issues The following issues are presented in the appeal:

Issue 1: Was the rejection of claims 9-12 and 14 as being anticipated by Wardwell (U.S. Patent No. 3,938,659) in view of Hunt et al. (U.S. Patent No. 5,077,104) proper?

Issue 2: Was the rejection of claims 13 and 15 being anticipated by Wardwell (U.S. Patent No. 3,938,659) in view of Hunt et al. (U.S. Patent No. 5,077,104) and further in view of Flieger (U.S. Patent No. 5,447,772) proper?

Issue 3: Was the rejection of claims 16 and 17 being anticipated by Wardwell (U.S. Patent No. 3,938,659) in view of Hunt et al. (U.S. Patent No. 5,077,104) and further in view of Wilking (U.S. Patent No. 5,698,217) proper?

Grouping of Claims Claim 9 is the only independent claim; claims 10, 11, 13, 14, and 15 depend from claim 9, claims 12 and 16 depend from claim 10 and claim 17 depends from claim 16.

Argument Applicant believes that the rejections are improper and should be reversed. First of all, applicants wish to emphasize that the heat sealing layer presented in the present claim 9 differ from the references, as explained below, with respect to the following limitations:

a single layer and not a laminate, and

resistant to the pharmaceutically active ingredient, and

not thicker than 15 g/m² weight per unit area, and

applied from a liquid phase in a printing mode, and

displays adhesion forces in the region of strength of the packing material.

Issue 1:

Applicant respectfully traverses the Examiner's rejection of claims 9-12 and 14 as being anticipated by Wardwell (U.S. Patent No. 3,938,659) in view of Hunt et al. (U.S. Patent No. 5,077,104). Wardwell teaches a frangible bonding system utilizing blush lacquer as frangible link and a heat sealable material. Packages comprising this frangible bonding system were particularly adapted for packing pharmaceutical products, which, in column 1, lines 13-15, are defined as sterile surgeon's gloves, masks, surgical dressings and surgical kits rather than pharmaceutical compositions

comprising pharmaceutically active agents. In column 5, lines 57-65, it is stated that the heat seal material shall provide a poor barrier to ethylene oxide which is a gas used for sterilization and that the gas penetrates the heat seal coating. This indicates that the desired heat seal material is permeable to gas and thus would be permeable to volatile active agents also.

Applicant respectfully submits that Examiner is incorrect in his statement in paper #8, page 4, that "Wardwell teaches ... a heat sealing layer wherein the heat sealing layer is formed by an active ingredient-resistant". Instead, Wardwell discloses a blush laquer which may be applied by printing (see column 5, lines 15-17), onto which the adhesive material or heat sealing layer is overlayed forming a bonding system; application of the heat sealing layer is by hot melt or in solution or suspension (see column 5, lines 42-45). Wardwell does not apply his heat sealing layer by printing, nor does he even mention active ingredient-resistance. Thus, taken by itself, Wardwell's teaching clearly leads away from the present invention. Therefore, it is believed that those skilled in the art would consider the teaching of Wardwell as unsuitable to solve the problem underlying applicant's inventive packaging because the heat sealing layer is not applied by printing and, since it enables penetration, is not resistant to the active agents.

On the other hand, Hunt et al. teach a very particular package for packing nicotine. This package essentially comprises a laminate of two different barrier layers. First, it contains a nicotine barrier layer comprising a nitrile rubber modified acrylonitrile-methyl acrylate copolymer and it further contains a nicotine degradation agent barrier layer in the form of an aluminum foil. The heat sealable nitrile rubber modified acrylonitrile-methyl acrylate copolymer is particularly suitable for nicotine. However, it remains unknown whether this polymer is also resistant to other pharmaceutically active agents. The aluminum foil provides a general protection against light and moisture to prevent degradation of the active agent. While it is impermeable to most active agents, aluminum foil is not heat sealable nor does it display adhesive forces in the strength of the packing material. Furthermore, to serve as a barrier layer being impermeable to moisture, gases, flavors and light, aluminum foil has to have a thickness of at least 20 μm , see Lexikon Folientechnik, attached. Given its specific weight of 2.702 g/cm², see Römpf Chemie-Lexikon, attached, an aluminum barrier layer would have a weight of at least 54.05 g/m² which would be far beyond applicant's heat sealable layer's claimed weight of 15 g/m².

Obviousness rejections are based on 35 U.S.C. 103(a). In ACS Hospital Systems, Inc. v. Montefiore Hospital, 221 USPQ 929, 933 the court stated that "Obviousness cannot be established

by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." The court elaborated by stating that "Under section 103, teaching of references can be combined *only* if there is some prior suggestion or incentive to do so." *Id.* The Examiner provides no such suggestion or teaching to support this combination of references. Applicant believes that one of ordinary skill in the art would not have been motivated to combine the teachings of Wardwell and Hunt et al. While, as Examiner states, each patent is a pharmaceutical packaging system using heat sealing, one can clearly distinguish between them in that Wardwell's system contains pharmaceutical supplies while Hunt et al.'s system contains pharmaceutical ingredients. Further, Wardwell's system enables gas penetration while Hunt et al. prevents it.

Moreover, a combination of both teachings might possibly suggest developing a frangible package comprising two different barrier layers, i.e. a laminate. However, a different, much simpler solution is presented by the present invention where a single layer is heat sealable, resistant against active agents and fairly low in weight. Such an unusual sealing layer as specified in the present claim 9 is definitely not suggested by the combination of both aforementioned teachings and those skilled in the art would not have been enabled to reach the present invention. Applicant respectfully requests that this rejection of claims 9-12 and 14 as being anticipated by Wardwell in view of Hunt et al. be withdrawn.

Issue 2:

Applicant respectfully traverses the Examiner's rejection of claims 13 and 15 as being anticipated by Wardwell (U.S. Patent No. 3,938,659) in view of Hunt et al. (U.S. Patent No. 5,077,104) and further in view of Flieger (U.S. Patent No. 5,447,772). Applicant believes there is no difference, whether or not the previous two publications, each one by itself or in combination with each other, are combined with the teaching of Flieger. Flieger presents a resealable bond between two or more overlapping multi-layer film surfaces comprising a plurality of closely spaced, interconnecting indentations, such bond to be used in general with plastic packaging. Any heat sealable compositions could be used, as shown in column 5, line 29 to column 6 line 8, regardless of whether they are resistant to an active ingredient or not. Among the putative polymers suitable, one can also find ethylene-methylacrylic acid copolymers.

Applicant believes that one of ordinary skill in the art would not have been motivated to combine the teachings of Wardwell and Hunt et al. with Flieger. As stated above, applicant finds no motivation to combine the teachings of Wardwell and Hunt et al. Further, Flieger is addressed

to plastic packages and has no reference, either direct or indirect, to pharmaceuticals. Moreover, the heat sealing aspect of Flieger is merely the ability of certain compositions to be sealed directly together with heat as opposed to directly sealing the overall package together with heat. Flieger's invention relates to resealable bonds which are not heat sealed. Applicant respectfully submits that those skilled in the art would not have been enabled, with these teachings, to reach the present invention. Accordingly, applicant respectfully requests that this rejection of claims 13 and 15 as being anticipated by Wardwell in view of Hunt et al. and further in view of Flieger be withdrawn.

Issue 3:

Applicant respectfully traverses the Examiner's rejection of claims 16 and 17 as being anticipated by Wardwell (U.S. Patent No. 3,938,659) in view of Hunt et al. (U.S. Patent No. 5,077,104) and further in view of Wilking (U.S. Patent No. 5,698,217). Applicant again respectfully believes that, as discussed above, there is no motivation to combine Wardwell with Hunt et al. Moreover, the Examiner states in paper #8, page 7, that "... Wardwell does not teach a packaging system comprising a layer within an area which is enclosed by the sealing layer, said enclosed layer entering into interaction with the packaged product and wherein the enclosed layer is formed by a moisture absorbent layer." In fact, Wardwell, in column 5, lines 67-68 and column 6, lines 1-2, suggests the use of heat seal materials which cannot be attacked by high temperature steam, that is, heat seal materials that, while permeable, do not absorb moisture. Wilking, by contrast, teaches a desiccant package for transdermal therapeutic systems with a special desiccant compartment, which is separated from the compartment containing the transdermal therapeutic system. The desiccant package is adhered to the water vapor impermeable sheet of the desiccant compartment by means of a pressure sensitive adhesive which immobilizes the package within the product package. The desiccant package is configured in any way that defines a compartment, see column 3, lines 45-46, yet this package does not touch or interact with the transdermal therapeutic system or its active substance, see Fig. 1. In claim 17 of the present application, a solution is presented where a "simple" desiccant layer interacts with, that is, directly touches, the packaged product. Thus the desiccant device is one layer instead of the package of Wilking. Moreover, Wilking's product resides in a product receiving space and does not abut the desiccant package. These distinctions results in applicant's packaging system being easier and more cost effective to manufacture.

Applicant believes that the teaching of the desiccant package according to Wilking does not suggest the use of a desiccant layer, especially not a desiccant layer which interacts with the

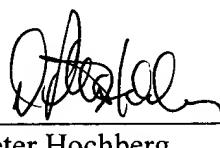
packaged product. Applicant further believes that one of ordinary skill in the art would not have been motivated to combine the teachings of Wardwell and Hunt et al. with Wilking, since the commonality between both references is merely that each is a packaging system using heat sealing for distinct types of pharmaceuticals. Wilking is packaging active substances while Wardwell is packaging surgical gloves and masks; Wilking is concerned with removing moisture from his package while Wardwell introduces moisture as part of the sterilization process. Applicant respectfully requests that this rejection of claims 16 and 17 as being anticipated by Wardwell in view of Hunt et al. and further in view of Wilking be withdrawn.

Applicant acknowledges the failure to respond to the Examiner's statements concerning the arrangement of the specification in paper #8, page 2, paragraph 1, but applicant will make the corrections to add section headings under separate cover.

The Examiner objected to claim 17 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Accordingly, applicant amended claim 17 to delete "encompassed" in an Amendment filed May 14, 2001.

For the foregoing reasons, it is respectfully requested that the rejection of claims 9-17 under 35 U.S.C. § 103 be reversed.

Respectfully submitted,

By: 
D. Peter Hochberg
Reg. No. 24,603

DPH/KRV

Enc.: Authorities, Recordation Form; Appendix A; Appendix B

D. PETER HOCHBERG CO., L.P.A.

1940 East 6th Street, 6th Floor

Cleveland, Ohio 44114

(216) 771-3800

CERTIFICATE OF MAILING/TRANSMISSION (37 C.F.R. 1.8(a))

I hereby certify that this paper (along with any paper referred to as being transmitted therewith) is being deposited with the United States Postal Service as first class mail on the date below in an envelope addressed to: Box AF, Commissioner for Patents, Washington, D.C. 20231.

May 14, 2001
Date


Katherine R. Vieyra

Attorney Docket No.: FLA-0012

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A S S I G N M E N T

WHEREAS, we Reinhard Koch, Frank Müller and Jorgen Friies, hereinafter referred to as the assignors, residing respectively at Frankenstrasse 71 b, D-53489, Sinzig, Germany; Sattelbergstrasse 23, A-6833, Klaus/Vorarlberg, Austria and Siland Vaenget 27 B, DK-5269, Odense S, Denmark are the joint inventors of certain inventions or improvements for which we have made application for Letters Patent to the United States, identified as Attorney Docket No. FLA-0012, entitled **Sealing Medium for Composite Packaging Materials**; and

WHEREAS, LTS LOHmann THERAPIE-SYSTEME GMBH hereinafter referred to as the assignee, of Neuwied, Germany a corporation of Germany, is desirous of acquiring the entire right, title and interest in and to the said inventions or improvements and in and to the said application, and in, to and under any and all Letters Patent which may be granted on or as a result thereof in any and all countries:

NOW, THEREFORE, for and in consideration of the sum of One Dollar (\$1.00) to each of us in hand paid by said assignee, and other good and valuable consideration, the receipt of which is hereby acknowledged, we, the said assignors, have sold, assigned, transferred and set over, and by these presents do hereby sell, assign, transfer and set over to said assignee, the entire right, title and interest in and to said inventions or improvements and said application and any and all continuations, divisions and renewals of and substitutes for said application, and in, to and under any and all Letters Patent which may be granted on or as a result thereof in the United States and any and all other countries, and any reissue or reissues or extension or extensions of said Letters Patent, and assign to and authorize said assignee, to file in our names applications for Letters Patent in all countries, the same to be held and enjoyed by said assignee, its successors, assigns, nominees or legal representatives, to the full end of the term or terms for which said Letters Patent respectively may be granted, reissued or extended, as fully and entirely as the same would have been held and enjoyed by us had this assignment, sale and transfer not been made.

AND we hereby covenant that we have full right to convey the entire interest herein assigned, and that we have not executed and will not execute any agreement in conflict herewith, and we further covenant and agree that we will each time request is made and without undue delay, execute and deliver all such papers as may be necessary or desirable to perfect the title to said inventions or improvements, said application and said Letters Patent to said

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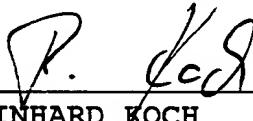
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assignee, its successors, assigns, nominees, or legal representatives, and each of us agrees to communicate to said assignee or to its nominee all known facts respecting said inventions or improvements, said application and said Letters Patent, to testify in any legal proceedings, to sign all lawful papers, to execute all disclaimers and divisional, continuing, reissue and foreign applications, to make all rightful oaths, and generally to do everything possible to aid said assignee, its successors, assigns, nominees and legal representatives to obtain and enforce for its or their own benefit proper patent protection for said inventions or improvements in any and all countries.

AND we hereby authorize and request the Commissioner of Patents and Trademarks of the United States and any official of any country or countries foreign to the United States whose duty it is to issue patents on applications as aforesaid, to issue to said assignee, as assignee of the entire right, title and interest, any and all Letters Patent for said inventions or improvements, including any and all Letters Patent of the United States which may be issued and granted on or as a result of the application aforesaid, in accordance with the terms of this assignment.

We further authorize and direct our attorneys to insert below* the serial number and filing date of said application now identified as Attorney Docket No. **FLA-0012** as soon as the same shall have been made known to them by the United States Patent Office.

IN WITNESS WHEREOF, we have hereunto set our hands and seals.



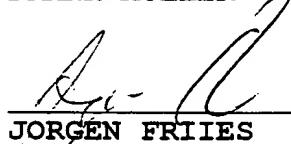
REINHARD KOCH

(L.S.)



FRANK MÜLLER

(L.S.)



JORGEN FRIIES

(L.S.)

Witnessed by:

Monica Müller _____
(Please print)
Name: **Monica Müller**
Address: **Leibnizstrasse 4
A-3107 F. Mühl**

Dated: 29.5.1999

executed the foregoing assignment, and who acknowledged to me that execution of the same was of that person's own free will for the use and purposes therein set forth.

Notary Public

*The above assignment covers application Serial No.
09/308,407, filed on May 19, 1999.

The above insertion made by me this 8th day of
July, 1999.

Jane Massey Licata
Jane Massey Licata, Reg. No. 32,257
of Law Offices of JANE MASSEY LICATA

erzeugen, wegen hoher Kosten und schlechter Qualität aufgegeben wurden. Seit 1950 erreichten die Walzwerke Breiten bis zu 1.000 mm. Heute liegen diese bei über 2.000 mm. Die Durchmesser der Arbeitswalzen betragen 200 bis 250 mm, die der Stützwalzen 300 bis 700 mm. Die Walzgeschwindigkeiten wurden im Laufe der Entwicklung ständig gesteigert und betragen heute bis zu 2.500 m/min. Die Gewichte der Folienrollen, bei Aluminiumfolien als Coils bezeichnet, liegen bei etwa 15 t. Derartige Leistungen sind nur durch rechnergesteuerte Anlagen und durch voll integrierte Transportsysteme möglich.

Ausgangsmaterial sind Walzbarren aus Reinaluminium, die bis zu 15 t Gewicht haben können. Diese werden von ihrer Gußhaut durch Fräsen befreit, in einem Glühofen auf ca. 500 °C erwärmt und auf Warmwalzwerken in mehreren Durchgängen zu Platten von 10 bis 15 mm gewalzt. Nach dem Erkalten werden diese mittels Bandwalzwerken auf eine Dicke von 0,6-0,8 mm gebracht. Die erhaltenen Binder werden besäumt, um Kantensisse zu entfernen, und dann aufgewickelt.

Bei der mechanischen Verformung durch das Kaltwalzen wird die Härtung des Materials wesentlich erhöht. Deshalb erhaltenen Vorratshänder müssen so erhitzen, dass sie bei 400 bis 500 °C wieder in einen weichen Zustand übergeführt werden, um die Weiterverarbeitung zu ermöglichen. Die Folien werden zweckmäßig gewalzt. Dadurch hat ihre der polierten Stahlwalze zugekehrte Seite eine glänzende

Oberfläche, während die der gleichzeitig gewalzten zweiten Folie zugekehrte Seite matt ist. Auch beidseitig hochglänzende Folien sind herstellbar. Man muß dann jedoch auf die größere Wirtschaftlichkeit der beidseitigen Walzung verzichten. Die Dicken solcher Folien liegen über 12-15 µm. Durch die starke mechanische Beanspruchung beim Folienwalzen wird das Material erneut sehr hart und erlangt keine Formänderung mehr. Durch einen weiteren Glühvorgang bei etwa 400 °C werden die Folien wieder geschmeidig und dehnbar gemacht. Die Folien-Doppelbahn wird dann in Einzelfolien auseinandergezwickelt. Durch das Zwickeln sind die Folien völlig frei und sehr sauber.

Beim Kaltwalzen der Vorratshänder werden spezielle, niedrig viskose Walzöle eingesetzt, durch die Rückstände höher viskoser Walzöle aus vorhergegangenen Walzprozessen restlos verdrängt werden. Die niedemannitischen Walzöle werden ihrerseits beim Glühprozess rückstandslos verdampft. Hierfür haben sich besonders niedermolekulare → Polybutene bewährt.

Die Dicke der Alufolien liegt zwischen 5 und 20 µm. Für Verpackungszwecke werden meist Folien mit 7 bis 20 µm verwendet, für die der DIN-Entwurf 1784, Blatt 3, gilt. Die Tendenz geht langsam weiter zu dünneren Folien; 6,75 und 6,35 µm sind bereits realisiert. Die Lösung des Problems der → Porosität wird jedoch bedeckt schwieriger. Die nach dem letzten Glühprozeß erhaltenen sogenannten "Weißen Folien" sind bereits unmittelbar für ei-

nige Anwendungen geeignet. Sie dienen vor allem zur Schottoladeverpackung, weil sie durch ihr ausgezeichnetes Wärmefüchtigkeitsvermögen das Füllgut vor Einwirkung höherer Temperatur schützen. Dies war das älteste Anwendungsbereich für Alufolien. Weiße Alufolien werden feiner als → Haushaltsfolien, → Kondensatorfolien und als → Isolierfolien eingesetzt. In den meisten Fällen werden Aluminiuminfolien und -bänder jedoch vor ihrem Einbau noch behandelt oder veredelt. Beispiele für Nachbehandlungen sind das → Prägen und → Büsten. Die Veredelung durch → Lackieren, → Kaschieren, → Bedrucken oder die Herstellung von → Aluminium-Verbänden dient vor allem der Verbesserung der mechanischen Eigenschaften. Diese sind, bedingt durch die unter → Aluminiumband näher beschriebene Struktur des Materials, für viele Anwendungsfälle beim Rohprodukt unbefriedigend. Aluminiumfolien sind ab 20 µm Dicke absolut undurchlässig für Wasserdampf, Gase, Aromatstoffe und Licht. Sie bieten deshalb als Verpackungsmaterial optimale Schutz für das Füllgut. Ihre gute Wärmehaftigkeit wird sich bei der → Dampfsterilisation und beim → Heißsiegeln günstig aus. Sie stehen in der Verpackung im Wettbewerb mit den meist transparenten Kunststofffolien, die durch Metallisieren modifiziert sein können. Aluminium- und Kunststofffolien bilden jedoch in sehr vielen Anwendungsbereichen eine wertvolle gegenseitige Ergänzung.

Aluminiumfolien wurden neben dem Gebiet der → Verpackung auch auf

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dem → Technischen Sektor vielfältig eingesetzt. Beispiele für einige auf der Hannovermesse Industrie Mai 1990 gezeigte neue Entwicklungen sind:

1. Schall- und Hitzeschutz. Im Motorraum von Kraftfahrzeugen werden insbesondere die Bereiche mit Katalysatoren sehr heiß. Isolationselemente aus beidseitig mit Aluminium-Folie verpreßten Mineralfasern bringen hier an Stelle der bisher verwendeten Elemente aus Voll-Aluminium wesentliche Gewichtseinsparung.
2. Flexible Röhre aus Glasgewebe, kombiniert mit Aluminium-Folien haben interessante Anwendungsbereiche in der Kfz-Industrie und im Maschinenbau.

3. Als Rückseiten von Solarzellen bieten Aluminium-Folien vollständige Wasserdampfspanne.

4. Mit Aluminiumfolie verstärkte Polypropylenrohre in Wasserleitungen sind stabil auch in der Wärme. Das Durchbiegen der Rohre („Wäscheklemmeffekt“) wird wirkam verhindert. Die wirtschaftliche Bedeutung der Aluminiumfolien ist sehr groß. Die in Europa produzierte Menge lag 1988 bei über 500.000 t. Der Pro-Kopf-Verbrauch ist in den einzelnen Ländern sehr unterschiedlich (s. Tab. S. 12). In den letzten Jahren war eine mittlere Mengensteigerung von 3% zu verzeichnen, obwohl die Tendenz zu immer dünneren Folien offensichtlich ist (Abb.).

Der Anteil an Folien mit Dicken unter 7 µm stieg um 14% im Jahre 1980 auf 25% im Jahre 1988.

Das für die Al-Gewinnung bei weitem wichtigste Stromausnützung (107) zwischen sind Elektrolysezellen mit 2 Innenzäpfen; frisch hergestellte, schutzschichtfreies Minerale sind von Eisenoxiden nicht röthlich gefärbte Bauxit, der aus der Hauptmasse aus einem Gemenge aus Aluminiumhydroxid-Mineralen (vorwiegend Böhmit) besteht. Größere Lager von "Bauxit (quart. Böhmit)" befinden sich im Südostasien, Angaben s. dort) befinden sich im Südostasien, Frankreich, Janitz, Guyana, Surinam, Dominikan. Republik, USA, Brasilien, UdSSR, China, Indien u. Indonesien; über die größten Vorräte verfügen Guinea u. Australien. Die BRD besitzt nur geringe Vorr. Von den anderen Al-Mineralen wie Alumini, Anorthit, Nephelin, Kastin u. den Tosen Konz. an Al im allg. zwischen 0,004 u. 0,5 rag pro 100 g Gewebe. Für Leber wurden Werte von 0,16 mg/100 g u. für Herz 0,056 mg/100 g gefunden, vgl. Lit.³.

Kern: Diese erfolgt fast ausschließlich durch Elektrolyse einer Lsg. von Aluminiumoxid in geschmolzenem Kryolith (Na₃AlF₆). Das verwendete Aluminiumoxid muß sehr rein sein, deshalb zerfällt die Härte des Al in zwei Arbeitsschritte, nämlich die Gewinnung von reinem Aluminiumoxid u. die eigentliche Elektrolyse. Zunächst werden die Baumit-Brocken durch das 1892 patentierten Bayes-Verfahren (des Österreichers K. I. Bayes) zerkleinert, getrocknet, zu einem Pulver verarbeitet u. in Autoklaven od. als sog. Rohstoffschütt im Durchlauf durch Einwirkung auf Wasserstoff umgesetzt. Aluminium umgewandelt, wobei die Oxide des Fe, Si, Ti usw. ungelöst bleiben (sog. Rotschlamm). Zur Löslichkeit von Böhmít in NaOH s. Lit.¹². Aus der Na-Aluminat-Lsg. scheidet sich nach Impfen, Abdichtung unter 90° u. beim Verdunsten mit Wasser krist. Hydratgült (vgl. Aluminiumhydroxide) aus. Dieser wird bei 1200–1300°C völlig entwässert ("calciniert"), wobei man Drehtrommel od. Vibrationsröhrchen benutzt (Abb. s. 8. Aufl. dieses Werkes). Statt Bauxit könnten auch "Kaoline u. s." Ton eingeschlossen werden¹⁴, doch sind noch keine wirtschaftlich konkurrenzfähigen Verfahren entwickelt worden.

Analyse: Man zieht die Al-Salze flüchtiger Säuren an der Luft (Bildung von Al₂O₃), befindet das Al₂O₃ mit wenig Kobaltnitrat-Lsg. u. glüht wieder, wobei "Cobaltblau entsteht. Spuren von Al in Lsg. (pH 5–7) erkennt man (selbst neben Beryllium) an der grünen Fluoreszenz, die nach Zusatz einer alkohol. Lsg. von "Morn" auftritt. In der quant. Analyse wird Al als Orthohydrat ausgefällt; dieses glüht man u. wiegt das entstandene Al₂O₃. Mehr od. weniger spezif. wirkende Al-Reagenzien (s. dort) sind Aurantricarbonyl-, Alizarin, Eriochromcyanin R, 8-Hydroxychinolin, Chloralkalium, Chinalizarin, Kupferron u. a., vgl. dazu Lit.⁸; über mikroskopometr. Best. von Verfahren s. Lit.⁹. Über spektrophotometr. Best. von Al neben Beryllium s. Lit.¹⁰, u. zur potentiometr. Best. von Al mittels Fluorid-Elektroden s. Lit.¹¹.

Kern: Etwa 81,3% der 16 km dicken Erdkruste besteht aus Al. Dieses ist somit das bei weitem häufigste Metall unseres Lebensraumes u. nach Sauerstoff u. Silicium das dritthäufigste Element der Erdkruste vor dem Eisen. Wegen seiner starken Affinität zum Sauerstoff findet man es allerdings nie gebunden, sondern stets in Form seiner Verbindungen. Al ist in vielen "Feldspäten (z.B. KAlSi₃O₈) = Orthoklas, NaAlSi₃O₈ = Albit, CaAl₂Si₂O₇ = Abordit) u. "Glimmern (z.B. KAl₂[AlSi₃O₈]·(KOH)₂ = Muskovit, CaAl₂[Al₂Si₂O₇]·(KOH)₂ = Margarit) u. ihrer Verwitterungsprod., den Tosen, in großem Umfang

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Zusammensetzung im Trockenstaub
Glühverlust, 15–25% Al₂O₃, 24–25% TiO₂, 5–20% SO₃, 5–12% Na₂O, 11% TiO₂, 5–20% SO₃, 5–12% Na₂O, Rotschlamm fällt in Mengen von 0,5 kg. Trotz neuerer Nutzungstechnik, Flüssigziegel, Gasreinigungsmaschine, Bodenverbesserungsmittel, Flüssigkeit und Füllstoff für Betonherstellung od. Stahlherstellung od. Füllstoff für Betonmaterialien wird der weitaus größte Anteil produziert nach wie vor deponiert. Abfallprodukte nach wie vor deponiert. Kryolith-Elektrolyse nachteilige Einflusszentrisches Fluorid wurde durch vertikale Abscheideeinrichtung beträchtlich gleichzeitig werden damit Al-Fluorid gewonnen werden kann. Für chemische Prozesse zurückgewonnen. Für chemische Prozesse zurückgewonnen. Geringe u. umweltfreundlichere Al-Prozesse in den 70er Jahren das "Alona-Verfahren" von AlCl₃ (aus Al₂O₃ u. Cl₂ ungeladen, wird in MnO₂ u. Cl₂ umgesetzt, wird in den Prozess variabel, cativiert. Hal-Herst.-Verfahren haben sie jedoch praktische Bedeutung erlangt. Für manche Zwecke reicht die Reinheit von 99,5–99,9% nicht aus. Es muss von > 99,999% hergestellt werden. Durch Zonenabscheidung kann Al durch elektrolytische Umschichten u. elektrolytische Schmelz- od. Umschmelz-Methode zu einem Zustand weitestgehend unbeschädigt. Im Weichgeglichenen Zustand besteht das Material aus durch Hämmer bis 0,004 mm durch Bruchdehnung auf, es kann durch Verdunsten mit Wasser krist. Hydratgült (vgl. Aluminiumhydroxide) aus. Dieser wird bei 1200–1300°C völlig entwässert ("calciniert"), wobei man Drehtrommel od. Vibrationsröhrchen benutzt (Abb. s. 8. Aufl. dieses Werkes). Statt Bauxit könnten auch "Kaoline u. s." Ton eingeschlossen werden¹⁴, doch sind noch keine wirtschaftlich konkurrenzfähigen Verfahren entwickelt worden.

Das trockne Al₂O₃ wird nun mit der ca. 10-läufigen Menge an synthet. Kryolith (wirkt als Legat. u. ermöglicht den Schmelz von 2300 auf 900–970°C) vermisch. u. in Elektrolysezellen durch Gleichstrom zersetzt (4–5 V, 80000–19000 A, 930°C). Das flüssige Al(O₂, 2,3%) sammelt sich auf dem Boden der mit Kohle ausgetriebenen, als Kathode dienenden Wanne unter der vor Rückwand schützenden Schmelze (D. 2,15). Die als Anode wirkenden Elektroden (Blockanoden od. "Söderberg-Elektroden") werden allmählich durch den feinverdampften Sauerstoff zerstört: $2\text{Al}_2\text{O}_3 + 3\text{C} \rightarrow 4\text{Al} + 3\text{CO}$, $\text{Al}_2\text{O}_3 + 3\text{C} \rightarrow 2\text{Al} + 3\text{CO}$.

Durch laufenden Eratz verbrauchten Elektrodenmaterialien läuft sich der – nach dem unzähligen vorhandenen Eisen und Eisen-Einfärbungen auch Haf-Herst.-Verfahren der arbeitenden Erfärbungen auch Haf-Herst.-Verfahren kontinuierlich gestalten. Zur Gewinnung von 1 t Hütt-Aluminium (99,5–99,8%ig) benötigt man 4 t Bauxit (gibt 2 Al₂O₃).

Metall (z.B. Mg, Fe, Zn) bedeutet, sind ziemlich säurebeständig, sie finden sich in der Natur als Al-Paiver (Alumino-silicat) von Wasser u. niederen Alkalien aus, unempfindlich gegen Aluminiumsalze, ether. Öle, Benzol, Benz, Fette, Fixier-Salz, Glycin, Harz, Kaliumperoxydat, Lack, Petroleum, (feste) Salpetersäure u. die meisten Lebensmittel Nährer über das Kommissionsverhältnisse des A. findet man in Lit.².

Physiologie: Der menschliche Körper enthält 50–150 mg Al; der größte Teil der täglich aufgenommenen Al-Menge (10–40 mg) geht unresorbiert in den Kot über. In den menschlichen Geweben liegen die Konz. an Al im allg. zwischen 0,004 u. 0,5 rag pro 100 g Gewebe. Für Leber wurden Werte von 0,16 mg/100 g u. für Herz 0,056 mg/100 g gefunden, vgl. Lit.³.

Al u. im Kontakt mit Lebensmitteln entstehende Verb. gelten generell als toxisch, unbefriedigend, doch sollen nach anderen Untersuchungen, hohe Al-Gehalte in der Nahrung (Schweinefleisch enthalten 0,07–0,185% Al u. Rindfleisch 0,1–0,8 mg Al/100 g) die "Arteriosklerose fördern u. den Phosphatspeicher zerstören können. Über mögliche Beeinträchtigungen von Gehirnfunktionen bei Langzeitbehandlung mit Aluminiumhydroxid s. Lit.⁶. Metall Al ist als körnelet. Färbenmittel zugelassen, u. einige seiner Verb. fungieren aufgrund aufstringierender u. ä. Effekte als "Antihistotika. Zusätze von Al-Metall MAK 6 mg Feinstaub/m³. Al ist ein guter Zündstoff, MAK 6 mg Feinstaub/m³. Al ist ein guter Leiter für Wärme (2–2,1–2,32 W/cm K) u. elektr. Strom ($\kappa = 34–38 \text{ m}^2/\text{W}$); die Höchstwerte gelten jeweils für 99,99%iges Al. Für elektr. Leiter werden neben dem E-Al (> 99,5% Al) Sonderlegierungen eingesetzt, die aufgrund ihres Gehaltes an Fe (<0,8%) u. a. Zusätzen bei Raum verhindert Leistungsfähigkeit besser machen. Eig. aufzuweisen. Obgleich Al ein sehr weiches Metall ist (es steht in der Spannungsgrenze zwischen Mangan u. Magnesium), ist es gegen Sauerstoff u. Luftfeuchtigkeit viel wirstig unsicher als z.B. Fe. Die Korrosionsbeständigkeit des Al beruht auf einer wenigen Molekül-Lagen dicke, harten, zusammenhängenden, durchschichtigen Oxid-Schicht, die sich z.B. auf frisch angereiztem Al an der Luft u. im Wasser schon in wenigen Sek. bildet. Die Schichtdicke ist zunächst nur wenige Zehntel mm dick, wächst in einem Monat auf 5–10 nm an u. bleibt dann fast unverändert, selbst wenn man längere Zeit auf 400°C erwärmt. Erst bei 450–500°C wächst die glassartige Oxid-Schicht weiter, ihre Dicke kann z. B. bei zweistündigem Erhitzen auf 550°C von 5 auf über 20 nm zunehmen. Durch Elektrolysestrahlen läuft sich die Al-Oberfläche durch Fe-Einfügung härten (vgl. Lit.¹). Al ist wisch- u. hartfähig in Gegenwart von Fluoriten, im Vak. od. unter Schutzgas. Ein Al-Lot besteht z. B. aus einer Al-Lsg. mit 7–12% Sulfat. Das Verhalten von Al in wässriger Medien ist vom pH-Wert des Elektrolyten abhängig. Die das Al schützende Oxidschicht ist im pH-Bereich zwischen 4,5 u. 8,5 weitgehend unlöslich. Von Blei-Salzen, Bromwasserstoffsaure, Eisessig, Salzen, Muskovit, Margarit, CaAl₂[Al₂Si₂O₇]·(KOH)₂ =

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Reinhard Koch, Frank Müller and Jorgen Friies
Serial No. : 09/308,407
Filed : July 8, 1999
Title : SEALING MEDIUM FOR COMPOSITE PACKAGING MATERIALS
Group : 1772
Examiner : M. Miggins
Attorney Dkt No. : RO0230US (#90568)

APPENDIX A
Claims as Currently Presented

Claims:

9. Packaging system made of composite packaging material for the sealed enclosure of products being subject to changes due to exchange with their environment or to partial volatilization of active ingredient comprising a barrier layer on the product side, to which barrier layer there is applied a heat sealing layer wherein the heat sealing layer is formed by an active ingredient-resistant layer having a layer thickness of maximally 15 g/m² weight per unit area, said active-ingredient resistant layer being applied from the liquid phase in a printing method and, after heat-activated sealing, displaying adhesion forces which are in the region of strength of the packaging materials.

10. The packaging system of claim 9 wherein the heat sealing layer covers only the sealing area.

11. The packaging system of claim 9 wherein a layer thickness of the heat sealing layer is between 2.5 and 3.5 g/m² weight per unit area.

12. The packaging system of claim 10 wherein a layer thickness of the heat sealing layer is between 2.5 and 3.5 g/m² weight per unit area.

13. The packaging system of claim 9 wherein the heat sealing layer comprises an

ethylene/methacrylic acid copolymer dispersion which displays no measurable active ingredient uptake.

14. The packaging system of claim 9 wherein the barrier layer comprises aluminum.
15. The packaging system of claim 9 wherein the chemical composition of the heat sealing layer is inert to nicotine.
16. The packaging system of claim 10 comprising a layer within a surface encompassed by the sealing area, said layer being able to enter into interaction with the packaged product.
17. The packaging system of claim 16 wherein the encompassed layer is formed by a moisture absorbent layer.

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APPENDIX B
Claim 17 as in Proposed Amendment

17. The packaging system of claim 16 wherein the [encompassed] layer is formed by a moisture absorbent layer.